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ABSTRACT

Having examined the Federal Aviation Administration's (FAA) current program for providing field training to developmental and full-performance-level air traffic controllers, the General Accounting Office (GAO) recommends ensuring that FAA and contractor personnel are providing training consistently and uniformly. Further changes needed to ensure quality and consistency in FAA's new on-the-job training program are the following: (1) a limitation on the number of instructors working with each developmental controller; (2) standardization of the process used to certify controllers on operating positions; (3) specification of a minimum amount of time for refresher training; (4) enhancing methods used for refresher training, perhaps by increasing the use of videotapes and enhanced computer-based instruction; and (5) ensuring that facilities are providing required refresher training on backup systems. In addition, the GAO recommends that the U.S. Secretary of Transportation, in order to improve the oversight of field training, direct the FAA to establish milestones to ensure the timely development of the training tracking system and to evaluate contractor performance. (CML)

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United States General Accounting Office
Report to Congressional Requesters

March 1989

FAA TRAINING

Continued Improvements Needed in FAA's Controller Field Training Program

ED308337

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GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-231265

March 29, 1989

The Honorable James L. Oberstar, Chairman
Subcommittee on Aviation
Committee on Public Works and Transportation

The Honorable Glenn M. Anderson, Chairman
The Honorable William F. Clinger, Jr.
Ranking Minority Member
Subcommittee on Investigations and Oversight
Committee on Public Works and Transportation
House of Representatives

The Federal Aviation Administration (FAA) is responsible for training over 16,000 air traffic controllers annually at about 420 field facilities. At the request of the former Chairman, and current Ranking Minority Member, Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation, we examined FAA's current program for providing field training to developmental and full performance level controllers.[1] In addition, we examined FAA's planned changes to determine if further opportunities exist for improving the program. We also determined whether FAA is evaluating contractor-provided training as required by federal regulations. (Appendix I contains our detailed objectives, scope, and methodology.)

Results in Brief

The National Transportation Safety Board (Safety Board) has linked deficiencies in training to impairments in air traffic safety. We found opportunities to improve both the delivery and oversight of the controller field training program. Specifically, we found that (1) on-the-job training (OJT) provided to developmental controllers at field facilities is not standardized despite recent FAA efforts to make it more uniform, (2) full performance level controllers are receiving only limited amounts of training to maintain and upgrade their knowledge and skills, (3) FAA does not maintain sufficient data to oversee controller field training, and (4) FAA has not evaluated contractor-provided training at en route centers.[2]

[1]A full performance level controller is one who is fully certified to operate all positions in a defined area.

[2]En route centers provide for control and separation of aircraft between destinations and over oceanic routes. A network of 20 centers is located in the contiguous United States.

FAA recognizes the need to improve its field training programs, and in August 1988, a series of initiatives was announced to improve controller training. (See app. II.) While these initiatives should strengthen FAA's training programs, additional changes are needed to improve both FAA's implementation and oversight of controller field training.

Background

Two principal types of training are provided in the field: (1) developmental training or training in the knowledge and skills needed to become a fully qualified controller and (2) full performance controller training, which is given to refresh controllers on existing procedures and introduce new ones. (See app. III.) FAA uses several methods to provide this training including classroom, OJT, and computer-based instruction.

Training is critical to an individual's successful performance as an air traffic controller and to the safety of the nation's air traffic system. The Safety Board has found that training deficiencies have contributed to controller errors at busy facilities, such as Chicago's O'Hare International Airport, and in at least two cases, to aircraft accidents and deaths. These training deficiencies included inadequate OJT and the need for refresher training in fundamental and essential control procedures. (See app. IV.) Moreover, FAA has found that over 14 percent of controllers' errors occur during OJT or involve controllers forgetting procedures they were taught during training.

Scope and Methodology

This report is based on work at FAA headquarters, the National Transportation Safety Board, and 11 FAA field facilities—5 en route centers and 6 terminals.[3] These facilities included four pairs of high-activity facilities (hereafter referred to as "four matched-pairs") and three other facilities selected on the basis of their special training characteristics. We selected the four matched-pairs to determine to what extent facilities with similar characteristics had similar training programs. We also reviewed the results of a 1988 GAO questionnaire received from 5,098 controllers, supervisors, and managers at 84 FAA facilities.

[3]Terminal facilities control aircraft within the area of one or more airports. Depending on the density and type of air traffic involved, a terminal facility may handle operations either for the airport at which it is located or for adjacent airports as well.

Field Training Problems Go Beyond FAA's Training Initiatives

FAA has announced plans to streamline the way controllers are trained in order to train them faster and better. These initiatives, which will be ongoing through the 1990s, include training professional instructors, using state-of-the art training technology, and redesigning the training curriculum. However, these training initiatives do not address the following problems we found in providing and overseeing field training.

On-the-Job Training Provided to Developmental Controllers Is Not Standardized

FAA's goal is to have a standardized training program. OJT provides actual air traffic control experience for developmental controllers to successfully qualify as a full performance level controller. Most OJT occurs when a developmental controller works one-on-one with an experienced controller to learn a specific control position. To standardize this process and enhance its quality and objectivity, FAA implemented new OJT procedures in August 1988. We found, however, that additional changes are needed to ensure that the standardization called for is achieved.

On-the-Job Training

FAA's new instructor requirements are an attempt to improve the quality of OJT instruction by (1) increasing the experience requirement for OJT instructors from 30 hours on a position to 6 months working a position and (2) requiring a core group of instructors at each facility rather than allowing all eligible controllers to provide OJT, thereby being more selective about instructors and using only those who understand how to train well. However, as an FAA contractor study pointed out, the new system does not include an important requirement for a successful training program—limiting the number of OJT instructors working with each developmental controller.

The contractor reported that FAA's widespread use of multiple OJT instructors resulted in ineffective training because developmental controllers did not receive consistent training and benefit from having a primary instructor to directly observe their performance over an extended period of time. The study stated that using a single or primary OJT instructor provides an environment more conducive to learning because developmental controllers need extended time with one OJT instructor to acquire good air traffic control techniques and instructors need extended exposure to students to competently assess performance.

During our field visits, we found that only one of the four matched-pairs we reviewed assigned a primary OJT instructor to each developmental

controller, while two matched-pairs assigned OJT instructors to developmental controllers solely on the basis of instructor availability. The fourth used both forms of assigning instructors.

Position Certification Process

OJT culminates in the position certification process, which is a technical appraisal of an individual's ability to control air traffic. At certification, all developmental controllers should have comparable knowledge, skills, and abilities. FAA headquarters officials recognize the need for a standardized method of certifying developmental controllers on specific operating positions to achieve this comparability. To increase objectivity, FAA issued a new OJT order in August 1988 that removed the evaluation responsibility from OJT instructors to third parties. However, the new order does not specify the exact position certification process to be followed. Consequently, the service provided to pilots continues to be inconsistent from facility to facility depending on the controller operating a position.

Facilities we visited used several different methods to conduct position certifications, and these evaluations lasted from 1 to 4 hours. Half of the facilities required that first-line supervisors certified on the position being appraised conduct the performance evaluation. The other half did not. Their methods included developmental controllers being certified without an evaluation. For example, at one facility, as part of the certification process, supervisors certify developmental controllers after reviewing their individual training records without observing performance.

Refresher Training Provided to Full Performance Level Controllers Is Inconsistent

FAA requires that full performance level controllers receive training on a recurring basis at field facilities to maintain and upgrade their knowledge and skills. The bulk of it is called "refresher training." (See app. III.) During our field visits, we found that refresher training is inconsistent in terms of the amount and method of instruction and, in light of the Safety Board's findings, may not ensure that controllers know how to operate backup air traffic control systems or remember new procedures.

In 1989, FAA plans to develop 10 core training courses for full performance level controllers, which it expects to begin using in early 1990. This effort, generally supported by managers at facilities we visited, should provide some level of standardized training. However, since FAA has not yet developed and tested these core courses, we could not determine

whether this initiative will correct the problems we found with refresher training.

Amount of Training

Field facilities are required to develop and administer annual refresher training programs that include training on unusual situations and seldom-used procedures because they train controllers on procedures and techniques that are essential for job requirements, but are not routinely used. Prior to the 1981 controllers' strike, FAA required that facilities provide 40 hours of training to each full performance level controller annually. In order to focus on developmental controller training, this specific 40-hour requirement was deleted from the national training order shortly after the strike; facilities are now given discretion to establish their own requirements. Headquarters officials believe it would be difficult to reestablish a national requirement for a specific amount of training primarily because facilities of different sizes do not require the same amount of training; and, consequently, a certain amount of flexibility is needed.

We found that the facilities we visited established different requirements and accomplished varying amounts of refresher training. Only one of the four matched-pairs required a similar amount of refresher training per controller—zero to 2 hours. The remaining three had different requirements ranging from 2 to 18, zero to 16, and 2 to 12 hours, respectively. Actual experience showed that only one matched-pair provided about the same amount of refresher training in fiscal year 1987; in contrast, one matched-pair provided 53 and 8 hours of training, respectively, per controller. (See table III.1.)

Further, in response to our 1988 survey of the controller work force, a majority of first-line supervisors responded that the amount of training was less than needed in areas of backup systems, simulation lab, and annual specialized training (airspace maps, facilities' operating procedures, etc.). (See table III.2.) Managers at the facilities we visited believed that this training has been limited, in part, because FAA's emphasis on developmental controller training and staffing shortages at some facilities has made it difficult to free controllers from working at control positions to attend classroom sessions. Headquarters officials agreed with this assessment.

Method of Training

In addition to facilities providing different amounts of refresher training, such training is mainly accomplished through self-study reading

material and as part of supervisor briefings of their staff, rather than through formal instruction (classroom, simulator, or computer-based). We found that two of our four matched-pairs did not provide any classroom training in fiscal year 1987; one provided a limited amount (a maximum of 16 hours per controller); and the remaining pair was split between providing zero and a limited amount (4 hours). One facility manager expressed concern that "do it yourself" refresher training allowed differing interpretation of information.

The contractor that evaluated FAA's training program referred to refresher training as a "perfunctory paper drill." The contractor stated that operational errors occurred because of inadequate refresher training and said that the best way to improve this training and reduce these errors is with improved refresher training methods (e.g., videotapes and enhanced computer-based instruction). Further, the Safety Board in its investigations of controller errors, found that even experienced controllers are not as familiar with facility procedures as they should be. For example, in November 1988, it reported that a senior radar controller committed an error involving the Presidential aircraft, in part because he was not familiar with facility procedures for separating and transferring aircraft—procedures taught and reemphasized during refresher training. (See app. IV.)

FAA headquarters officials stated that a "total overhaul" of refresher training is needed but explained that some of the field's current informal training methods are used in an effort to do the best they can because resources are not available at all facilities to provide formal instruction.

Data to Oversee Field Training Is Insufficient

FAA headquarters officials recognize that they do not have the information needed to oversee field training and have supported establishment of a training tracking system since October 1987. They believe such a system would provide ways to compare training programs between facilities by measuring pass/fail rates, monitoring OJT instructor performance, and projecting developmental staffing needed to achieve desired full performance controller staffing levels. However, FAA headquarters does not track full performance level controllers training.

Currently, FAA requires facilities to submit some training data on developmental controllers to its Civil Aeromedical Institute, which uses the data to ensure that initial training at the FAA Academy does not, among

other things, discriminate against minorities. However, FAA headquarters officials and a contractor that reviewed FAA's training system said these data are incomplete. For example, the system does not contain information on transferred developmental controllers or on recently hired former military controllers. Therefore, pass/fail rates and hours of training for these and all other controllers that are important to judge the quality of facility training and to determine whether FAA is achieving its goal of providing standardized instruction are not included.

Although training branch officials had hoped to develop the system by late summer 1989, in February 1989, they indicated that system development has been delayed to a large extent until fall 1989. Delays are occurring, among other things, because of (1) turnover of personnel in the responsible branch, (2) hardware and software acquisitions, (3) installation of training records in the system, (4) coordination between FAA offices that will use the data, and (5) security of the system. The system is expected to include information discussed above on both developmental and full performance level controllers.

Having one tracking system may also reduce the effort now devoted by facilities we visited in maintaining their own developmental controller tracking systems. However, none of these facilities forwarded their data to FAA headquarters or tracked full performance level controller refresher training.

FAA Has Not Evaluated Contractor Training at En Route Centers

FAA is using contractors to provide classroom and laboratory training to developmental controllers at all en route centers. From April 1986 through January 1989, FAA spent about $55 million for this service. FAA plans to continue contractor training until at least 1994 and is expanding it to several terminal facilities. (See app. V.) However, FAA has not evaluated the training contractors' performance as required.

Federal Acquisition Regulations and the contracts' statements of work provide for agencies to perform actions necessary to ensure that contractor services meet contract specifications. The contracting officer or technical representative is responsible for evaluating contractor performance at each en route center. According to the contracting officer's technical representative, budget constraints, including FAA's absorption of the 4-percent federal pay raise, have prevented FAA from performing these evaluations. In addition, from June 1987 through March 1988, air traffic officials made some observations on contract instruction during

their evaluations of centers' training programs. However, these evaluations have also been suspended because of resource constraints. In January 1989, FAA officials said that they plan to evaluate contractor performance on the new contracts. They also intend to more actively compete for resources to perform these evaluations.

Field management has varying concerns with contractor training. For example, officials at two centers we visited were dissatisfied with contractor-provided training, citing problems with (1) instructors not being as familiar as they should be with current procedures and equipment and (2) field managers being unable to take corrective action when poor instructor performance is identified.[4] The other three centers were generally satisfied with contractor training but also noted that instructors are not up-to-date on procedures. In addition, a majority of center managers responding to our recent questionnaire believed that FAA should let the training contracts lapse. (See app. VI.) Contract evaluations could help FAA headquarters to determine why managers feel this way and to judge the effectiveness of contractor training and the corrective actions needed to make the program more effective.

FAA's current controller training contracts expired at the end of January 1989. On January 31, 1989, FAA issued new contracts to the same contractors for up to 5 years at an estimated cost of $120 million. FAA plans to expand the use of contractors to other terminal facilities similar to that done at Chicago, Los Angeles, and Oakland. However, FAA does not plan to evaluate contractor-provided training in fiscal year 1989.

Conclusions

If controller field training is to be effective and responsive to the agency's needs, FAA must ensure that FAA and contractor personnel are providing training consistently and uniformly. FAA recognizes the need for more standardization in field training, but its training initiatives do not fully address the issue. Further changes are needed to ensure quality and consistency in FAA's new OJT program by (1) limiting the number of OJT instructors working with each developmental controller and (2) standardizing the process used to certify controllers on operating positions. Although using primary OJT instructors may be difficult for understaffed facilities, we believe that the number of instructors per developmental controller should be reduced to the extent possible.

[4]Under the contracts' terms, the contracting officer may dismiss a contract instructor.

FAA also needs to better ensure that full performance level controllers receive the training needed to maintain and upgrade their knowledge and skills. To do this, FAA needs to provide a minimum amount of refresher training to each controller, and use training methods that will enhance learning. Increasing the use of videotapes and enhanced computer-based instruction would be one way to do this.

FAA headquarters does not now have the information needed to oversee controller field training but plans to develop a new training tracking system. We believe that developing and implementing a tracking system as soon as possible is crucial because when this system is fully implemented, FAA's oversight of training should improve.

In addition, FAA needs to improve its oversight of contractor-provided training at en route centers. FAA has not evaluated contractor performance even though the program is being expanded to selected terminal facilities. While we recognize that FAA believes budget and other constraints have limited its ability to evaluate contractor-provided training, oversight of such training is fundamental to good management practices. Moreover, since controller training is critical to a safe national air traffic system, it is imperative that the training being provided is of high quality.

Recommendations to the Secretary of Transportation

To improve controller training programs, we recommend that the Secretary of Transportation direct the Administrator, FAA, to

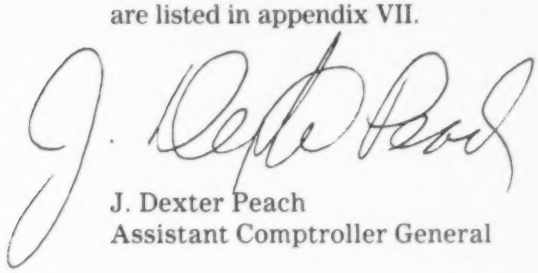
- revise its training orders to (1) limit, to the extent practicable, the number of instructors per developmental controller, (2) establish a uniform process for conducting controller certification evaluations, and (3) specify minimum time requirements for refresher training hours;
- ensure that facilities are providing required refresher training, such as training on backup systems; and
- enhance refresher training methods for full performance level controllers. One way of doing this would be to increase the use of videotapes and enhanced computer-based instruction.

Further, to improve its oversight of field training, we recommend that the Secretary of Transportation direct the Administrator, FAA, to (1)

establish milestones to ensure the timely development and implementation of the training tracking system and (2) evaluate contractor performance, in view of the additional funds committed for contractor-provided training.

As agreed with your office, we did not obtain official agency comments on a draft of this report. However, we did discuss its contents with officials at FAA headquarters and the National Transportation Safety Board, who agreed with the information presented, and we have incorporated their views where appropriate.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 15 days from the date of this letter. At that time, we will make copies available to the Secretary of Transportation; the Administrator, FAA; interested congressional committees; and others. This work was conducted under the direction of Kenneth M. Mead, Director, Transportation Issues. Major contributors to the report are listed in appendix VII.



J. Dexter Peach
Assistant Comptroller General

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Abbreviations

FAA	Federal Aviation Administration
GAO	General Accounting Office
OJT	on-the-job training
RCED	Resources, Community, and Economic Development Division

Objectives, Scope, and Methodology

On September 21, 1987, the former Chairman and current Ranking Minority Member, Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation, requested that we examine FAA's current program for providing field training to developmental and full performance level controllers. In addition, we examined FAA's planned changes to determine if further opportunities existed for improving the program. We also determined whether FAA is evaluating contractor-provided training as required by federal regulations.

This report is based on work at FAA headquarters, the National Transportation Safety Board, and air traffic facilities in five FAA regions. These facilities formed the basis of our matched-pair analysis—a comparison of the organization, conduct, and success of training programs at four pairs of FAA facilities. Three additional facilities were selected to obtain an understanding of specific training issues (Seattle center and North Philadelphia and Atlantic City airport terminals[1]).

To select the four matched-pairs, we used data from FAA's Personnel Management Information System and FAA's fiscal year 1986 air traffic activity report. We used the personnel system data to compare the mid-fiscal-year (Mar. 31, 1988) number of on-board full performance level controllers with total controller staffing at each of the busiest air traffic facilities.[2] We used the activity report to compare facility air traffic levels. We then analyzed the data to find pairs of facilities with similar characteristics, and judgmentally selected eight facilities (four pairs) according to: the percentage of on-board full performance level controllers, level of air traffic activity, facility type and level, and FAA region as shown in table I.1. The purpose of selecting pairs of facilities was to determine to what extent facilities with similar characteristics had similar training programs.

[1]Seattle center is using a unique radar-training program for developmental controllers. North Philadelphia and Atlantic City terminals are examples of smaller facilities that must constantly retrain controllers since they lose fully qualified controllers to larger facilities because of promotions.

[2]All level 2 and 3 centers and terminal facilities with at least 60 radar operations per hour (level 4 and 5).

Table I.1: Matched-Pair Facilities Visited by GAO

Paired facility	Percent of full performance controllers	1986 air traffic operations	Facility level	FAA region
Centers:				
Fort Worth	73	1,759,054	3	Southwest
Houston	72	1,641,786	3	Southwest
Oakland	51	1,472,395	3	Western-
Los Angeles	54	1,651,367	3	Pacific
Terminals:				
Pittsburgh	76	483,104	5	Eastern
Washington (National Airport)	72	489,730	5	Eastern
Dayton	66	331,336	4	Great Lakes
Cleveland	62	335,926	4	Great Lakes

To determine how field training is provided to developmental and full performance level controllers, we reviewed internal evaluations that were available for the facilities we visited. At each facility, we analyzed data on training resources (personnel and equipment), training work load, and tracking systems. We reviewed a sample of individual training records to determine (1) whether facilities are providing OJT to developmental controllers in accordance with national requirements and (2) how much refresher training is being provided to full performance level controllers.

Further, we determined methods used by each facility to provide (1) OJT and refresher training and (2) conduct control position certification evaluations. We also obtained available facility data from FAA's Civil Aeromedical Institute on training success rates and average time in training before achieving the full performance level.

We interviewed facility management on all of these issues, and obtained their views on center contract training and relevant FAA initiatives (new OJT order, new operational position standards, and facility-specific radar training). We also interviewed controllers about developmental and full performance level controller training at their facilities.

We also reviewed available documentation on (1) FAA's justification for its contracts for en route center training, (2) contract specifications and modifications, (3) periodic contractor reports submitted to FAA headquarters, (4) efforts to conduct contract evaluations, and (5) FAA's long-

term plans for the contracts. We interviewed FAA headquarters officials on all of these issues. We also reviewed a Department of Transportation Inspector General report (No. AV-FA-8-029, June 7, 1988) on the contracts.

To help us identify opportunities for improving FAA's field training programs and to minimize duplication of effort, we reviewed the final reports from two FAA contractors who recently evaluated FAA's air traffic training programs. We also reviewed available documentation on a series of initiatives announced by FAA's Administrator in August 1988 to revamp the way FAA trains air traffic controllers. (See app. II.) Finally, to assess the relationship between training and controller errors and/or aircraft accidents, we interviewed National Transportation Safety Board officials and reviewed training-related reports. (See app. IV.)

To determine perceptions of current field-training effectiveness, we relied primarily on our analyses of responses to training questions in our 1988 questionnaire survey of (1) full performance level and developmental controllers certified on at least one radar position, (2) first-line supervisors, and (3) facility managers at 84 facilities. (See app. VI.) These facilities were the 20 en route centers in the continental United States and the nation's 64 largest terminal facilities. The 1988 survey included questions from our 1985 survey, as well as questions on new topics, such as morale, airline scheduling, and airline hubbing. Of 6,469 questionnaires distributed, we received 5,098 responses, for an overall return rate of 79 percent. Details of our questionnaire procedures, sampling methodology, and tabulated survey results are contained in a separate report that we expect to issue in the near future.

Our work included a limited review of FAA's internal controls related to controller training. We reviewed Transportation's and FAA's internal control reports submitted in response to the Federal Managers Financial Integrity Act of 1982, which did not identify any weaknesses in this area.

We conducted our review from March through November 1988, and updated selected data as of February 1989. Our review was performed in accordance with generally accepted government auditing standards.

FAA Training Initiatives

On August 5, 1988, FAA's Administrator announced that FAA was embarking on an ambitious evaluation to upgrade and modernize its air traffic controller training program. This evaluation was the culmination of almost a year of study on the part of FAA and two contractors. FAA's evaluation was done in two stages—(1) completion of studies and (2) consensus building and review of recommended changes by FAA officials.

Contractor and In-House Evaluations

In September 1987, FAA, working through the Office of Personnel Management, awarded a contract to examine its controller training program. Two projects were undertaken—to design the next generation of the air traffic training system and to examine the current management of controller training. Reports on these issues were completed in May and June 1988.

In November 1987, FAA formed an in-house task force called the FAA Technical Training Review Group to examine how well it manages its technical training for controllers, inspectors, and maintenance technicians. This task force had a broad charter to look at training requirements, training costs, material acquisition, delivery and preparation of training, and staffing for the administration of training. It issued a final report and recommendations in March 1988.

Building Consensus

In June 1988, when the contracted studies were completed, FAA began synthesizing the recommendations of these three evaluations to determine what changes made the most sense and could be implemented. Two groups were eventually formed—one for air traffic training and another for flight standards and airway facilities training.[1]

In late July 1988, these groups completed a paper defining nine major training initiatives which were announced by the Administrator in August. These initiatives included

- establishing an Office of Training;
- establishing a national recruitment program;
- establishing a new relationship with academia and industry;

[1]Aviation standards is the organization for FAA's aviation safety inspectors; airway facilities is the organization for FAA's maintenance personnel.

- developing a new air-traffic-screening program;[2]
- improving OJT;
- improving the training curricula offered by FAA;
- upgrading the technology available at the FAA Academy;
- expanding the role of FAA's Center for Management Development in providing executive training; and
- establishing an Institute for Human Resources Research to improve FAA's research in the areas of selection, training, human performance, and human factors.

Since August, FAA has been (1) defining specific projects that would implement these initiatives and (2) refining cost estimates for these projects. In October 1988, FAA reorganized its training organization and created an Office of Training and Higher Education to elevate the status of training within FAA and improve management of training.

Major Initiatives Affecting Controller Field Training

Of the nine initiatives announced by FAA, two have particular significance for controller field training—improving OJT training and improving the training curricula. The OJT initiative is to be completed in three phases. Phase I, described in this report, will enhance existing requirements and courses. Phase II will develop new courses for both OJT instructors and examiners. Phase III will provide for course revisions as a new curriculum for air traffic is implemented. Phase III is scheduled for completion in March 1992.

The new air traffic curriculum will expand the use of simulators, provide more site-specific training, and add more basic training at the Academy for terminal controllers. FAA also plans to (1) redesign the training curriculum to better teach the thought processes and skills needed by controllers, (2) develop a full performance level controller training curriculum, and (3) establish radar training centers throughout the country. These projects will be implemented through 1994. FAA is also developing a curriculum for facility managers, training administrators, and evaluators to help them provide better management of the training program.

[2]Air traffic screening includes the Office of Personnel Management aptitude test, and the initial 11-week program of instruction and testing that controller candidates undergo at the FAA Academy in Oklahoma City, Oklahoma.

Field Personnel Support FAA's Efforts to Improve Controller Training

Since a major focus of FAA's initiatives is to modernize field training and replace labor-intensive training methods with simulation and state-of-the-art technology, we discussed the initiatives with FAA field personnel and National Transportation Safety Board officials. We found that both field personnel and the Safety Board support the need to modernize controller training.

Specifically, we found that in response to our recent survey of facility managers, more than half who responded believed the amount of simulator equipment at their facilities is inadequate. (See app. VI.) The Safety Board also reported in its investigation of controller errors at Chicago's O'Hare International Airport that FAA needed to upgrade its simulator equipment. It said that equipment limitations resulted in unrealistic simulation problems that did not reflect the airport's actual traffic conditions. In addition, field managers also generally agreed with FAA's initiative to expand the use of facility-specific radar training.[3]

[3]Facility-specific radar training allows developmental controllers to train on airspace they will control at their home facility, and uses problems from that facility. Under the usual (or generic) radar-training program, developmental controllers are instructed on fictional airspace.

FAA's Training for Developmental and Full Performance Level Controllers

To train air traffic controllers, FAA has established a training program with many directives and guidelines. Controllers receive initial training at the FAA Academy and then are assigned to the field for training to the full performance level. On average, it takes 2.8 years to train a controller to the full performance level, from entry into the FAA Academy to completion of training.

FAA's Developmental Controller Training

Air traffic controllers begin their training at the FAA Academy in Oklahoma City, where they are enrolled in an 11-week program designed to screen out those without the potential to become full performance level controllers. Academy graduates are assigned to FAA field facilities. Except for this initial training at the Academy and a subsequent return for an introduction to radar, most controller training occurs at the trainees' assigned facilities.

FAA has established Instructional Program Guides for centers and terminals that outline training program requirements. Additional guidance is provided in three FAA orders:

- National En Route and Terminal Air Traffic Training Programs (order 3120.18A),
- Air Traffic Training (order 3120.4G), and
- Air Traffic Control Specialist On-The-Job Training and Position Certification (order 3120.24).

Field training at centers includes classroom and simulator training provided by contract personnel, and OJT provided by FAA controllers. The training program consists of 13 phases as a controller progresses from the entry level to the full performance level. Developmental controllers must achieve a specified level of performance before proceeding to the next phase. Field training at terminals, provided primarily by FAA personnel, includes classroom and simulator training, and OJT instruction. The terminal training program consists of 11 phases designed to accommodate the needs of various levels of terminal facilities.

FAA's Full Performance Level Controller Training

Once controllers become fully qualified, FAA provides them with proficiency training, which is required to maintain and upgrade the knowledge and skills necessary to apply air traffic procedures in a safe, orderly, and expeditious manner. Three types of full performance level controller (or proficiency) training exist: (1) periodic refresher training on topics such as unusual situations (e.g., handling traffic in bad

weather or hijack situations), (2) supplemental training required when significant changes in procedures occur, and (3) remedial training used to correct an individual's operational deficiencies.

Most of the full performance level controller training provided by field facilities is refresher training, which is designed to ensure that controllers remain at their operational peak. While controllers control traffic continuously, there may be extended periods of time when they do not employ some procedures and techniques in which FAA requires them to be proficient. Thus, refresher training should occur periodically and, at a minimum, cover those areas that may be infrequently encountered on position but are essential for optimum performance.

FAA does not have a standard refresher training program; rather, it provides general guidance for field facilities to use in developing and administering their own local refresher training programs. This guidance, contained in FAA order 3120.4G, includes the following:

- Training for (1) unusual situations, such as aircraft equipment failure, hijacking, and other types of emergencies, (2) seldom used procedures, such as those for separating aircraft without using radar, (3) traffic and safety advisories, and (4) areas identified as needing reinforcement.
- At least 2 hours of simulation training on the above topics for facilities with simulation capability.
- Quarterly training in lost aircraft orientation.
- Semiannual training on techniques for applying nonradar procedures or operating with backup equipment.

Table III.1 summarizes refresher training requirements contained in facility training orders, as well as the average amount of refresher training provided to each full performance level controller in fiscal year 1987 for each of our four matched-pairs.

Table III.1: Refresher Training Requirements and Amount Provided in Fiscal Year 1987

Paired facilities	Hours required per controller	Average hours provided
Centers:[a]		
Fort Worth	16 classroom and 2 simulator	53
Houston	2 simulator	7
Los Angeles	2 simulator	9
Oakland	Required, but amount unspecified	3
Terminals:		
Pittsburgh	40 proficiency, refresher unspecified	18
Washington (National Airport)	Required, but amount unspecified	19
Cleveland	2 simulator	29
Dayton	Required, but amount unspecified	35

[a]Center data are for one area of operation within each facility. We selected the area with the highest number of full performance level controllers at the time of our visits.

As shown in table III.2, a majority of the 939 first-line supervisors who responded to our recent questionnaire believe that the amount of full performance level controller training at their facilities was less than needed in the areas of backup systems, simulation lab, and annual specialized training.

Table III.2: Supervisors' Views on Amount of Full Performance Level Controller Training

Figures in percent

	Much less than needed	Somewhat less than needed	About the right amount	Somewhat more than needed	Much more than needed	No basis to judge/don't know[a]
DARC/other backup systems	27	40	30	1	1	7
Simulation (DYSIM/ETG) lab	33	31	31	3	2	8
Annual specialized training (map, operating procedures, letters of agreement, etc.)	22	34	39	4	2	1
Computer-based instruction	22	25	39	8	6	6
OJT instructor performance evaluation	12	24	53	7	4	1
Tape monitor review	5	17	64	10	5	0
Over-the-shoulder evaluation	2	11	73	9	5	0

Question: For each of the following types of FPL (full performance level controller) proficiency training that FPLs have received, is the amount of training more or less than needed, or is it about the right amount? If you work at an enroute center answer for your area of specialization; if you work at a terminal answer for your schedule.

[a]Response to this answer was not considered in calculating percentages for other response categories.

Controller Training Problems Identified by the National Transportation Safety Board

The National Transportation Safety Board is responsible for investigating and making safety recommendations on all civilian aviation accidents and other aviation safety problems. The Safety Board has found that inadequate FAA training has caused controllers to commit errors. The Safety Board has recommended improvements in FAA's controller training because, in some cases, these errors have contributed to aircraft accidents and loss of life.

Training and Aircraft Accidents

The Safety Board found that controller training deficiencies contributed to loss of life in midair collisions in Independence, Missouri, on January 20, 1987, and Orlando, Florida, on May 1, 1987. For example, it found that improved radar training for controllers would have prevented the accidents. In the first accident, the Safety Board predicted that catastrophic accidents at certain locations may occur in the next 10 to 12 years if improvements are not made to upgrade radar equipment and training. The Safety Board also recommended that an ad-hoc task force be established to develop improvements in the radar portions of developmental and full performance level controller training.

Training and Controller Errors

Controller errors have been a major concern of the Safety Board, which has issued several reports including: a report of Runway Incursions at Controlled Airports in the United States, dated May 6, 1986; reports on Chicago's O'Hare International Airport, dated May 27, 1986, February 6, 1987, and August 8, 1988; and a report involving Air Force One, dated November 15, 1988.

The Safety Board stated in its 1986 report on runway incursions that FAA controllers did not have the best available training in certain duties. Deficiencies in their training were cited as long-term and would require a dedicated effort by FAA to correct. According to the Safety Board:

"The FAA should reexamine the on-the-job training controllers receive and review the qualifications of the instructor to ensure that on-the-job training is given, whenever possible, by experienced and motivated full performance level controllers rather than by developmental controllers or full performance level controllers, who, while highly qualified, may not have had many hours of experience at a certain position."

In its O'Hare airport reports, the Safety Board reported that generally, most errors indicated basic controller performance flaws that should have been identified and corrected through proficiency training before

they contributed to errors. In its latest report on the O'Hare airport, 5 of 12 recommendations were related to controller training. For example, the Safety Board recommended that O'Hare implement a back-to-basics program including refresher training in fundamental and essential control procedures, and require that all radar controllers complete the course content. It also reported that

"... a lack of quality OJT instruction may, on occasion, exist today at O'Hare and compromise the total training effort ... such conditions could be responsible, directly or indirectly, for an increase in operational errors."

In its November 1988 report on an error involving Air Force One and a commercial airliner, the Safety Board reported that deficiencies in proficiency training and other operational areas contributed to the error. The proficiency training deficiencies included lack of refresher training on seldom used procedures, and traffic and safety advisories. For example, a senior radar controller committed an error, in part, because he was not familiar with facility procedures for separating and transferring aircraft. These procedures are taught during refresher training.

The Safety Board was also particularly concerned that these deficiencies had been identified by internal evaluations over the past 2 years, yet FAA had been unsuccessful in eliminating them. Over 36 deficiencies were identified covering proficiency training as well as interfacility coordination, transfer of control of aircraft, and effectiveness of air traffic management. The Safety Board stated that

"... these deficiencies represent a serious lack of effective management and quality assurance ... and, if not corrected, could lead to an erosion of safety in the high traffic density northeast ... system."

Further, the Safety Board said that:

"The facts revealed during the investigation of this operational error are yet another example where the quality of controller ... performance is substandard."

Contractor Training at En Route Centers

In February 1986, FAA's Administrator decided that to increase the number of full performance level controllers available to control traffic, FAA should not use controllers for staff positions such as training. FAA then decided to contract out the training and automation functions in en route centers.

In April 1986, FAA contracted with two firms to provide this controller training. One contractor was to provide training at centers in the Alaska, Eastern, Great Lakes, New England, and Northwest Mountain Regions. The other contractor was to provide training at centers in the Central, Southern, Southwest, and Western-Pacific Regions. The contracts were awarded for about 9 months with options for 2 additional years and expired the end of January 1989. During the first year, contractors phased their instructors into the centers and started training in October 1986.

Among other things, the contractors were required to

- develop tests, lesson plans, and other course materials using national and regional training guidance;
- develop and administer simulation problems;
- maintain and manage individual training records, files, and directives;
- track the certifications of on-the-job training instructors; and
- participate in students' ratings.

During 1988, additional changes were made to expand the responsibilities of these contractors. One contractor was asked to develop a prototype class of refresher and supplemental training for terminal controllers in the Eastern Region. On October 13, 1988, this contract was further modified to provide on-site training for controllers at O'Hare airport and its associated terminal facilities. This modification requires the contractor to provide

- classroom and simulated radar training for developmental controllers;
- supplemental, remedial, and refresher training for all controllers; and
- computer-based instruction.

The other contractor was similarly asked to conduct terminal training for 18 developmental controllers from Los Angeles and Oakland.

FAA has continued to contract for training. In June 1988 in response to a request from a Subcommittee of the House Appropriations Committee,

FAA submitted a plan showing how it could phase out the training contracts by December 31, 1990. FAA's conclusion was that while it would be possible to take back these functions, to do so would represent "a significant drain on the controller workforce" and would require additional authorized positions and personnel compensation funding.

On January 31, 1989, FAA awarded two new contracts to provide controller training. The contracts are for 1 year with 4 optional years. The estimated cost for both contracts is about $24 million for each of the 5 years ($120 million estimated total). FAA is requiring, in addition to existing provided-training, that the contractors develop simulator problems for its en route centers. The contractors will also provide terminal training in all FAA regions.

Selected Questionnaire Results on Controller Training

Figure VI.1: Views on Quality of OJT Provided to Developmental Controllers

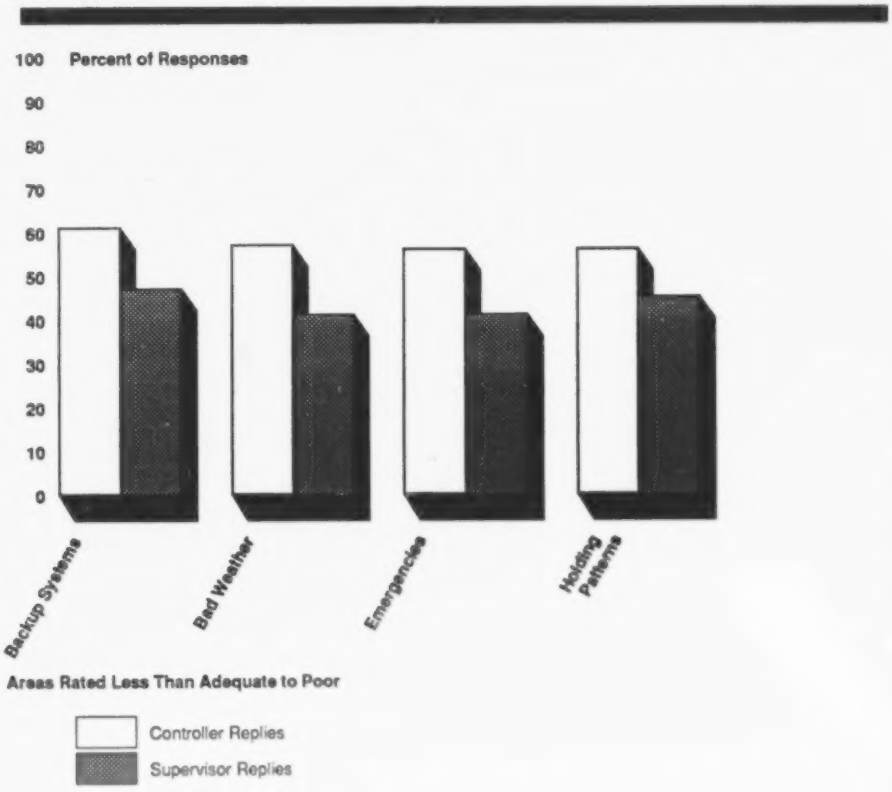


Figure VI.2: Center Managers' Views on Current Training Contracts

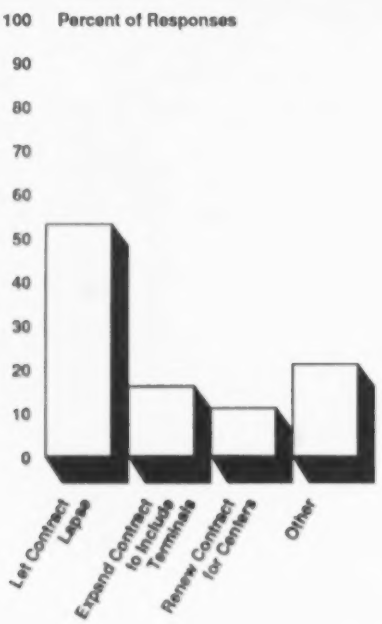
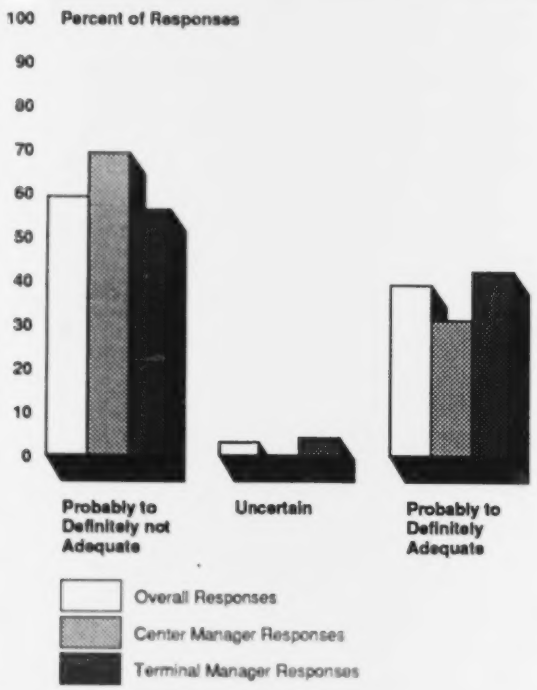


Figure VI.3: Facility Managers' Views on Amount of Simulator Equipment



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